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Age, geochemical affinity and geodynamic setting of granitoids and felsic volcanics in the basement of Wrangel Island

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Granitoids and basic rocks of Wrangel Island are the components of Precambrian metamorphic basement, exposed in the anticlinorium in the central part of the island and named as Wrangel complex (Kameneva, 1970; Ageev, 1979; Til'man et al., 1964, 1970; Ganelin, 1989; Kos'ko et al., 1993, 2003). The latter is composed of volcanic, volcaniclastic and clastic rocks metamorphosed in greenshist to locally lower amphibolite facies (Kos'ko et al., 2003; Cecile et al., 1991).

Obtained earlier datings of granitoids and basic rocks from Wrangel complex display a wide scatter: 609–700 Ma, U-Pb zircon (Cecile et al., 1991; Kos'ko et al., 1993); 590 Ma, Pb-Pb zircon; 574, 575 Ma, K-Ar whole rock; 475 Ma, Rb-Sr muscovite (Kos'ko et al., 2003). Our previous U-Pb SHRIMP datings indicate the episode of granitoid activity in 681–707 Ma (Luchitskaya et al., 2014).

Here we present new results from zircon SIMS and LA-ICP-MS U–Pb dating and geochemical data for granites and felsic volcanics of Wrangel complex.

Granites of Wrangel complex in the area of Khishchnikov River form small tabular bodies less than 30 meters in thickness. They range from slightly recrystallized muscovite granites to gneissic and mylonitic ones.

Felsic and basic volcanics are exposed in the central part of Wrangel Island (rivers Neizvestnaya and Krasnyy Flag). Their interrelations are unknown and earlier they were considered as single bymodal assemblage of C1 sequence (Kos'ko et. al., 1993, 2003). Samples were collected in the area of Pervaya Mountain, visible thickness of volcanics $\sim$100 meters. Basalts are overlain by conglomerates with detrite zircons no younger than 550 Ma (Moiseev et al., 2009, 2015).

Wheited mean ages of zircons from muscovite granites and mylonitic ones are 592.9$\pm$6.7 Ma (n=10) and 692.9$\pm$5.0 Ma (n=30); in two samples we suppose the age of crystallization $\sim$700 Ma. Wheited mean ages of zircons from felsic volcanics are 594.4$\pm$7.1 Ma (n=10) and 598.6$\pm$7.5 Ma (n=10).

Granites and felsic volcanics have high contents of alkalis (K2O= 4.15–5.79%, Na2O= 2.28–3.78%) and belong to high-K calc-alkaline series.

In TAS classification granites and gneisses, mylonitic ones are classed with granites and felsic volcanic, with rhyolites. In the Frost et al., 2001 classification granites and felsic volcanics are classed with magnesian (Fe*=FeO*/(FeO*+ MgO)=0.71–0.79), calc-alkalic and alkali-calcic (MALI=Na2O+K2O-CaO=6.92–7.68) and peraluminous (ASI=1.13–1.35) granitoids.

Spidergrams of granites and felsic volcanics are enriched in LILEs in respect to HFSE, show negative anomalies of Ba, Nb, Ta, LREE, Sr, Ti and positive anomaly for Pb.

On FeO*/MgO vs (Zr+Nb+Ce+Y) and Zr vs 104Ga/Al (Whalen et al., 1987) diagrams, muscovite granites and granitic gneisses fall in the field of I- and S-types granites, mylonitic granites and felsic volcanics, on the line between I-, S-granites and A-type granites fields or in the A-type granites field.

Conclusions. 1. U-Pb zircon data indicate two stages of felsic magmatic activity in Wrangel complex at $\sim$700 and $\sim$600 Ma. 2. Granitoids of Wrangel complex belong to highly fractionated peraluminous I-type granites; felsic volcanics have similarity to A-type granites. 3. Granitoids of the 600 Ma stage may be derivates of I-types granites of Andian continental margin or postcollisional ones; felsic volcanics are part of bymodal rift-related assemblage, associated with extention setting. The latter is confirmed by rifting nature of spatially associated basalts (Moiseev et. al, 2009; Moiseev et al., 2015).

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